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Patent No. 6,780,258

Request for Cert. of Correction dated January 12, 2005

Attorney Docket No. 2204-012023



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No. : 6,780,258 *B2* Confirmation No. 4472
Inventors : Katsuki et al.
Issued : August 24, 2004
Title : Austenitic Stainless Steel Less Susceptible
To Cracking During Forming And A
Manufacturing Method Thereof
Examiner : Deborah Yee
Customer No. : 28289

Certificate
JAN 25 2005
of Correction

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT
FOR PTO MISTAKE (37 C.F.R. 1.322(a))

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: Decision and Certificate of Correction Branch
Patent Issue Division

Sir:

In accordance with 35 U.S.C. §254, we attach hereto Form PTO/SB/44 and a copy of proof of PTO error(s) and request that a Certificate of Correction be issued in the above-identified patent. The following errors appear in the patent as printed:

Column 1, after Line 65, under SUMMARY OF THE INVENTION,
the following paragraph should be added:

--The present invention aims at provision of a cleaned austenitic stainless steel sheet good of formability by converting inclusions to soft precipitates without generation of hard galaxite.--

(See application as filed, Page 2, Lines 16-18.)

Respectfully submitted,

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26 JAN 2005

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO. : 6,780,258 *B2*

DATED : August 24, 2004

INVENTOR(S) : Katsuki et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, after Line 65, under SUMMARY OF THE INVENTION,
the following paragraph should be added:

--The present invention aims at provision of a cleaned austenitic stainless steel sheet good of formability by converting inclusions to soft precipitates without generation of hard galaxite.--

{W0163166.1}

MAILING ADDRESS OF SENDER:

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PATENT NO. 6,780,258

No. of additional copies



This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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26 JAN 2005



SUSCEPTIBLE TO CRACKING

~~AN AUSTENITIC STAINLESS STEEL LESS CRACK SENSITIVE~~
~~DURING FORMING AND A MANUFACTURING METHOD THEREOF~~

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to an austenitic stainless steel ^{that has good} ~~good of~~ formability and ^{is less susceptible to cracking} ~~less crack sensitive~~ during forming, and also relates to a method of manufacturing thereof.

2. Description of Related Art

Austenitic stainless steel has been applied to various uses in broader industrial fields, e.g. parts of motor vehicles and electronic parts, due to its excellent formability compared with other types. As development of usage, a demand for provision of cheaper material becomes stronger and stronger.

In order to meet with such the demand, the inventors have continued investigation on material design directed to soft austenitic stainless steel, which is scarcely work-hardened, while saving addition of expensive Ni content. As results of the investigation, the inventors proposed new austenitic stainless steel resistant to work-hardening and good of hot-workability, as disclosed in JP 9-263905 A1. The proposed austenitic stainless steel contains austenite formers such as Cu and Mn at proper levels, while hardening elements such as C and N contents are controlled to lower levels.

Parts or members for motor vehicles and electronic devices are designed to a small size or lightened in these days. The trend of small-sizing or lightening needs provision of a steel sheet, which is good of formability capable of forming to an objective shape with a heavy drawing ratio but thinner compared with a conventional steel sheet. Due to severe forming conditions, nonmetallic inclusions put significant influences on occurrence of cracking during forming. Typical inclusion, which promotes occurrence and development of cracking, is galaxite (MnO·Al₂O₃) in a high-Mn steel sheet.

Fig. 1 is a MnO-Al₂O₃ phase diagram (reported by Oelsen, W.G. Heynert, Arch. Eisenhüttenwes, 26(1955), p.567). Galaxite, which is generated at 1720°C, is hard inclusion. Once galaxite is precipitated in a steel matrix at a steel-making or casting step, it is not deformed by hot-rolling or cold-rolling. Consequently, galaxite of several tens μm in size, which is equal to a size of galaxite generated at the steel-making or casting step, remains as such in a steel sheet. A steel sheet for use as a part of an electronic device or the like is of 0.1-0.5 mm in thickness. As decrease of thickness of a steel sheet, the size of galaxite is not neglected but accelerates initiation of cracking during forming. Even when cracking is suppressed, galaxite acts as a starting point to generate scratches on a surface of a product. If a surface of a product is damaged by scratches, the product cannot be offered to the market.

15 SUMMARY OF THE INVENTION

The present invention aims at provision of a cleaned austenitic stainless steel sheet good of formability by converting inclusions to soft precipitates without generation of hard galaxite.

PA ✓
20 ~~crack sensitive~~ ^{susceptible to cracking} The present invention proposes a new austenitic stainless steel less crack sensitive during forming, which has the composition consisting of C up to 0.04 mass %, 0.1-1 mass % Si, Mn up to 5.0 mass %, S up to 0.0060 mass %, Al up to 0.003 mass %, 5-9 mass % Ni, 15-20 mass % Cr, N up to 0.035 mass %, 1.0-5.0 mass % Cu and the balance being Fe except inevitable impurities. Nonmetallic MnO-SiO₂-Al₂O₃ inclusions, which contains not less than 15 mass % of SiO₂ and not more than 40 mass % of Al₂O₃, is dispersed as fine particles in a steel matrix.

The stainless steel is manufactured by covering molten steel with basic slag in a vacuum or non-oxidizing atmosphere and strongly deoxidizing the molten steel by addition of a Si alloy whose Al content is controlled less